

20. A microfluidic device comprising:

a circular disc which is adapted for rotation about its axis and comprises two substrates between which there are predetermined pathways for liquid flow, and

a valve which is present in a pathway for liquid flow and is defined as the boundary between surface areas of different relative hydrophilicities or hydrophobicities in one of the substrates in the pathway.

21. The microfluidic device of claim 20, wherein said pathways are hydrophilic and said valve is formed at a hydrophobic section in a pathway.

22. The microfluidic device of claim 20, wherein interior walls connecting the two substrates define the pathways.

23. The microfluidic device of claim 20, wherein the device comprises an inlet towards the axis of the device.

24. The microfluidic device of claim 20, wherein the device comprises a series of inlet ports arranged at spaced intervals around the axis.

25. The microfluidic device of claim 20, wherein the device comprises an inlet for liquid towards the center and an annular outlet for liquids towards the circumference of the device.

26. The microfluidic device of claim 20, wherein the pathways have dimensions enabling capillary forces to act upon the liquid within the channels.

27. The microfluidic device of claim 20, wherein the pathways comprise hydrophilic surfaces and that at least one of the hydrophilic surfaces has been treated to enable the culture of cells.

28. The microfluidic device of claim 27, wherein the device further comprises a separate pathway containing a hydrophobic break and the pathway is a gas pathway or a sample inlet port.

29. The method of claim 20, wherein the liquid has a surface tension $> 18 \text{ mNm}^{-1}$.

30. The method of claim 20, wherein the liquid is an aqueous solution or suspension having a surface tension $> 50 \text{ mNm}^{-1}$.

31. A method of controlling flow of a liquid in a microfluidic device comprising the steps of:

providing a microfluidic device, wherein the device is a circular disc which is adapted for rotation about its axis and comprises two substrates; and

treating at least one substrate such that the surface of the treated substrate has relative hydrophilic or hydrophobic characteristics forming a pathway or valve for liquid flow of the liquid.

32. The method of claim 31, wherein the surfaces of the pathways are hydrophilic and the valve is formed by a section in a pathway having a hydrophobic surface.

33. The method of claim 31, wherein the microfluidic device comprises two parallel substrates for flow of liquids flowing in predetermined pathways between the substrates.

34. The method of claim 31, wherein the flow of liquid across the valve is prevented unless the liquid has been provided with sufficient energy to enable it to overcome the differences in surface energy of the surface areas.

35. The method of claim 34, wherein centrifugal force created by rotating the device is used for applying energy to the liquid in order for the liquid to pass the valve.

36. The method of claim 31, wherein the pathways have dimensions enabling capillary force to act upon the liquid within the pathways.

37. The method of claim 35, wherein the liquid flows down the pathway to the valve by capillary action whereupon energy is applied to the liquid in order for it to pass the valve.

38. The method of claim 37, wherein the centrifugal force created by rotating the device provides the energy.

39. The method of claim 31, wherein the liquid has a surface tension $> 18 \text{ mNm}^{-1}$.

40. The method of claim 31, wherein the liquid is an aqueous solution or suspension having a surface tension $> 50 \text{ mNm}^{-1}$.

41. The method of claim 31, wherein treating is selected from the group consisting of masking and plasma treatment, hydrophilic photoresist, crosslinkable surface active polymer, polymerizable surfactants, photo-oxidation, and electron beam treatment.